



Innovation in Hydrogen and its role in the Energy Transition

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Ceres is a FTSE 250 leading developer of clean energy technology, for power and green hydrogen.

Our licensing model enables us to partner with some of the world's most progressive companies to decarbonise at scale and pace.



"Climate change is running faster than we are, and we are running out of time."

United Nations Secretary-General António Guterres



Global greenhouse gas emissions

Steel	7-9%	Source: World Steel Association
Cement	7%	Source: IEA
Chemicals	5-7%	Source: IEA
Marine	2-3%	Source: IMO

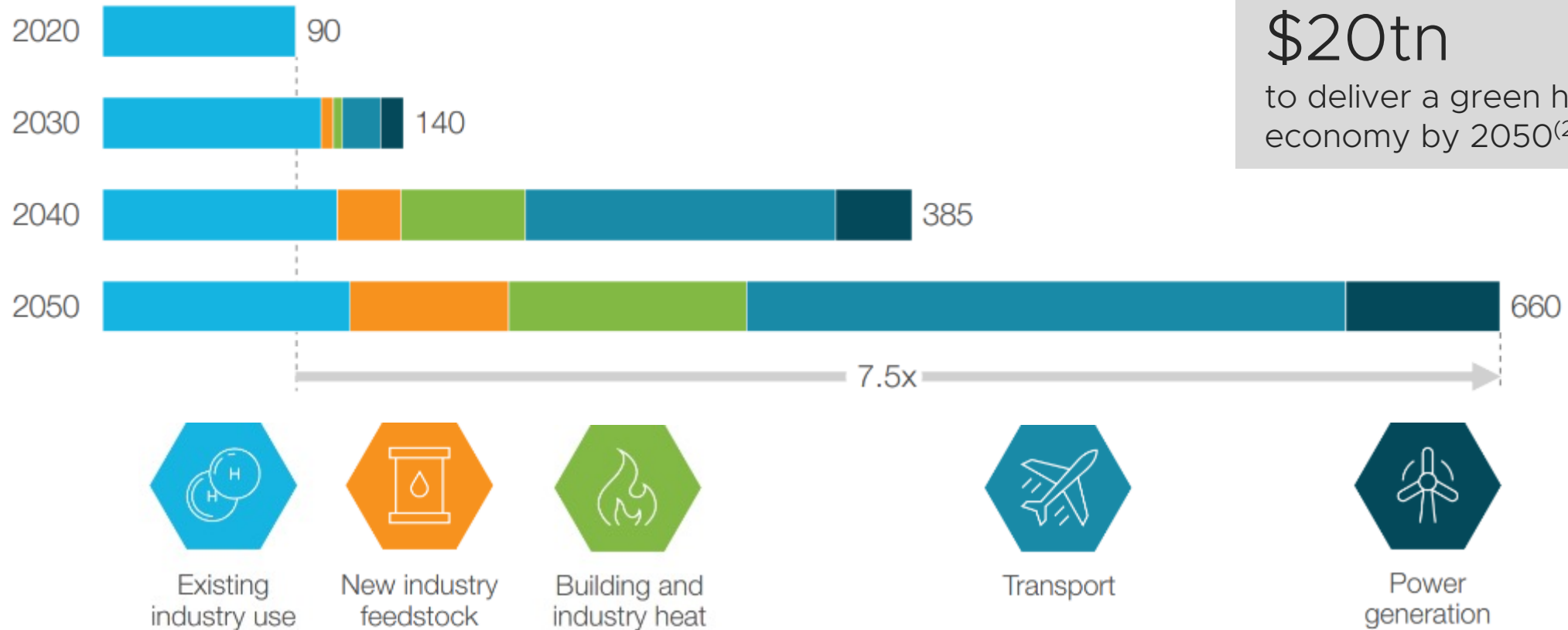


Hydrogen has
a unique role
to play in hard
to abate
sectors



2050 demand scenario for hydrogen

Global hydrogen demand, MT⁽¹⁾



22%
of global final energy
demand in 2050⁽¹⁾

\$20tn
to deliver a green hydrogen
economy by 2050⁽²⁾

(1): Global Hydrogen Flows, Hydrogen Council 2022
(2): The staggering cost of a green hydrogen economy,
Financial Times May 2023

3585 GW

IEA estimate of electrolyser capacity needed by 2050

1GW cumulative installations today



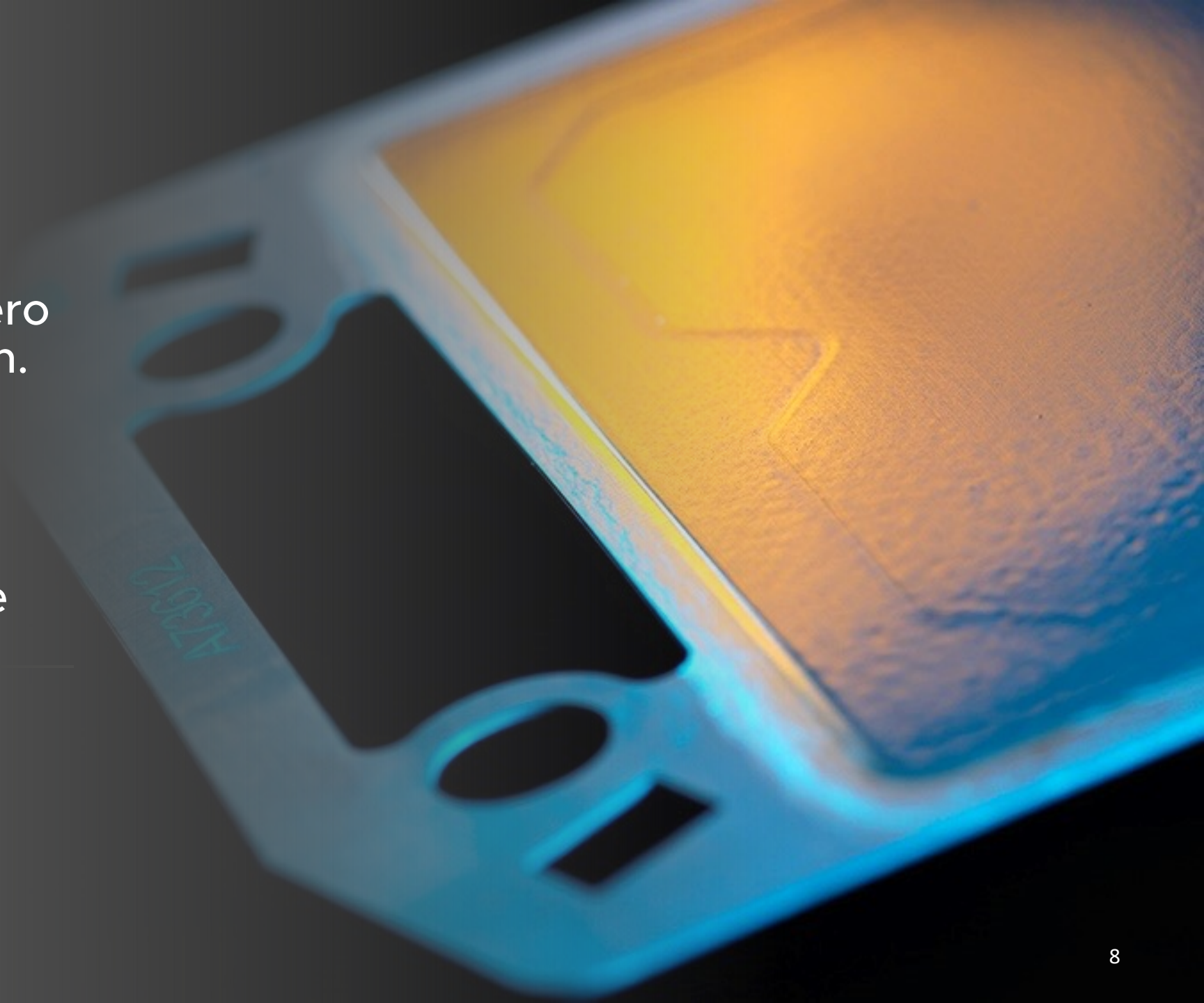
100GW

of capacity every year

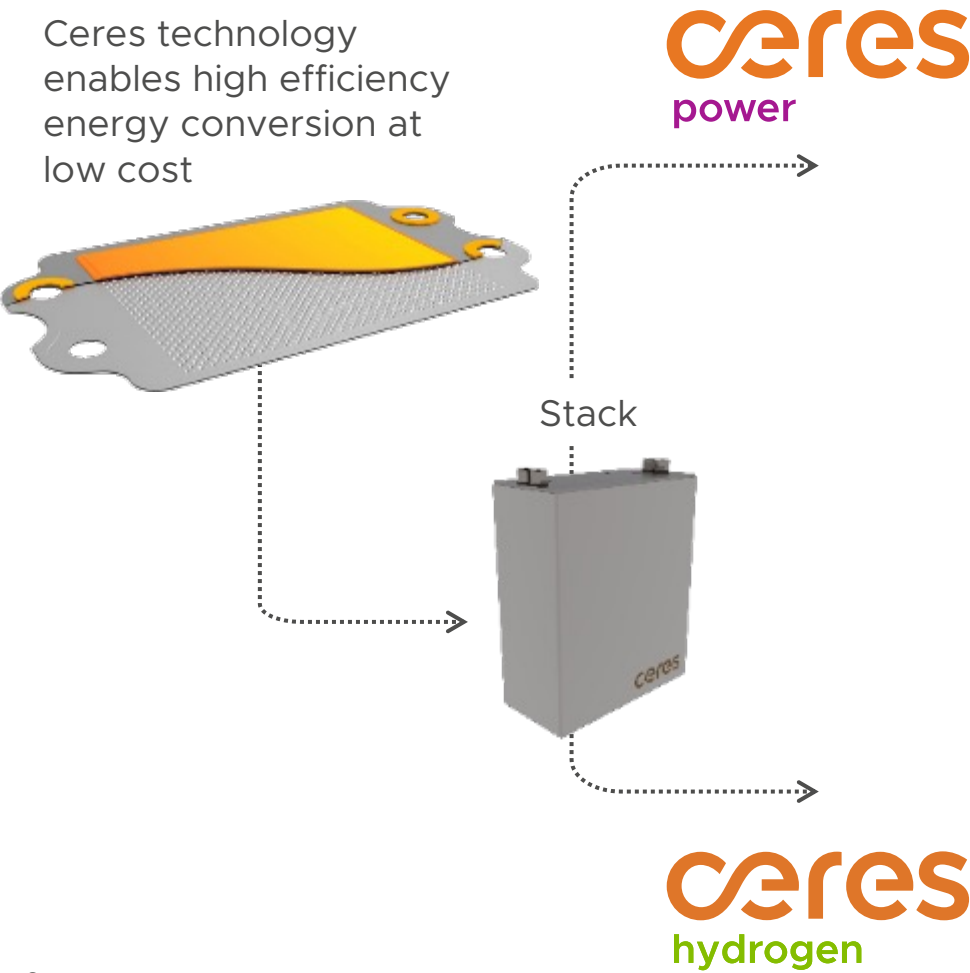


We cannot reach net zero
without green hydrogen.

To create **economically**
viable green hydrogen,
you need
efficient technology like
that which Ceres has
developed.

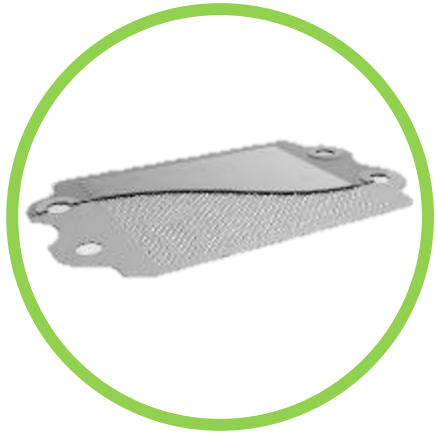


Technology platform to address decarbonisation



Modular scale-up concept

Cell



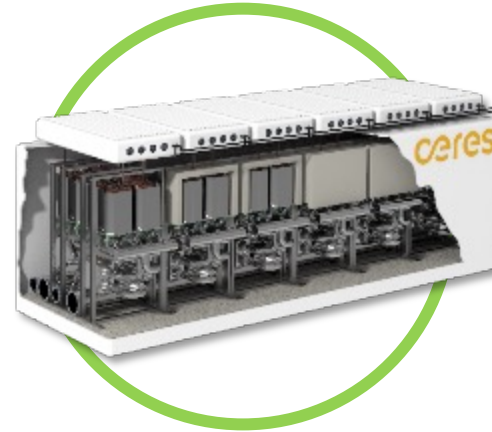
Stack



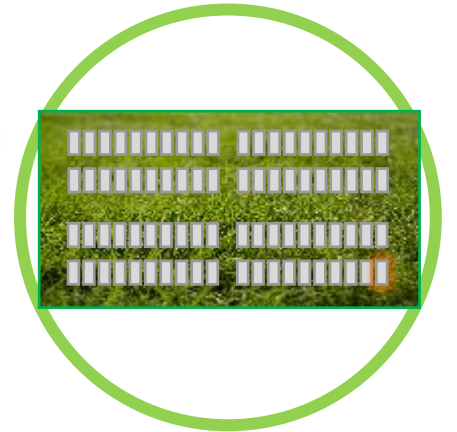
Stack array



Module



GWs Plant



Industrial decarbonisation of green steel, green ammonia, e-fuels. Chemicals, oil and gas

Ceres technology highly differentiated

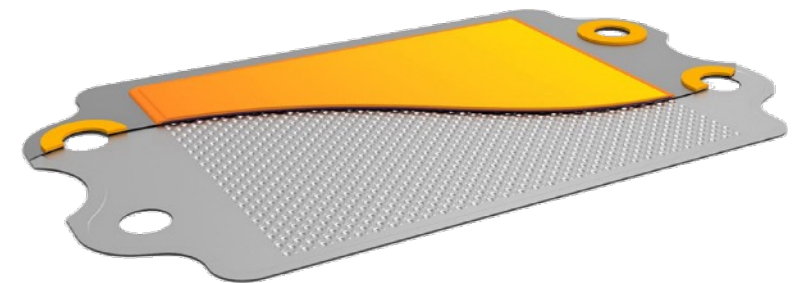
Ceres solid oxide cell

- Highly efficient, c.60% in power mode
- >80% efficient in electrolysis mode
- Lower temperature than existing SOFC/SOEC
- Fuel flexible
- Steel backbone, robust and scalable
- Made from widely available materials
- Operates in fuel cell or electrolysis mode

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power

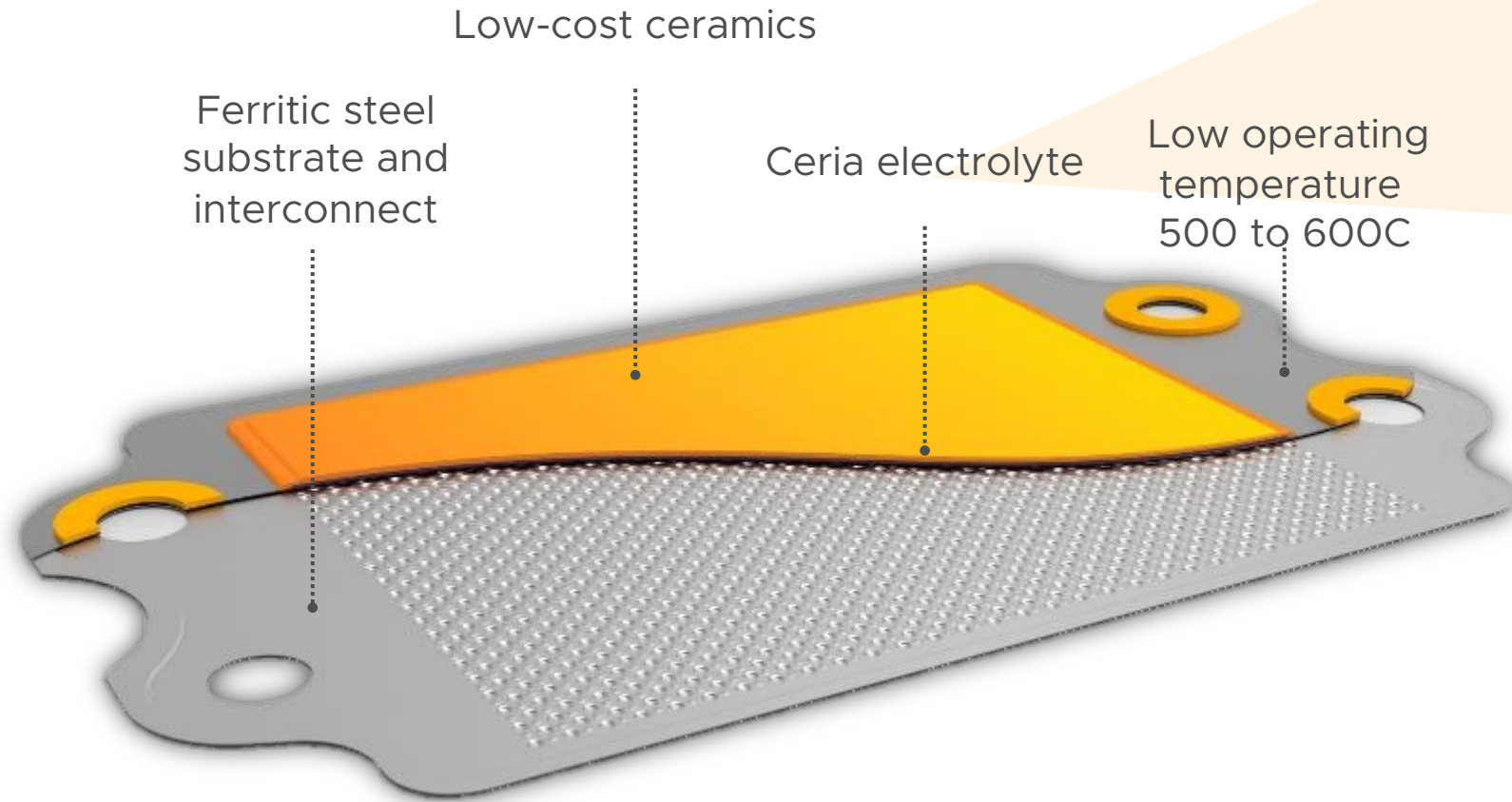
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hydrogen

Technology Family	PEM	SOFC	Ceres SteelCell®
Efficiency		✓	✓
Fuel	Hydrogen only	Nat Gas Liquid fuels Bio fuels Hydrogen	Nat Gas Liquid fuels Bio fuels Hydrogen
Cost	✓		✓
Robust	✓		✓
Applications	Transport	Stationary	Both



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Low-cost, sustainable materials

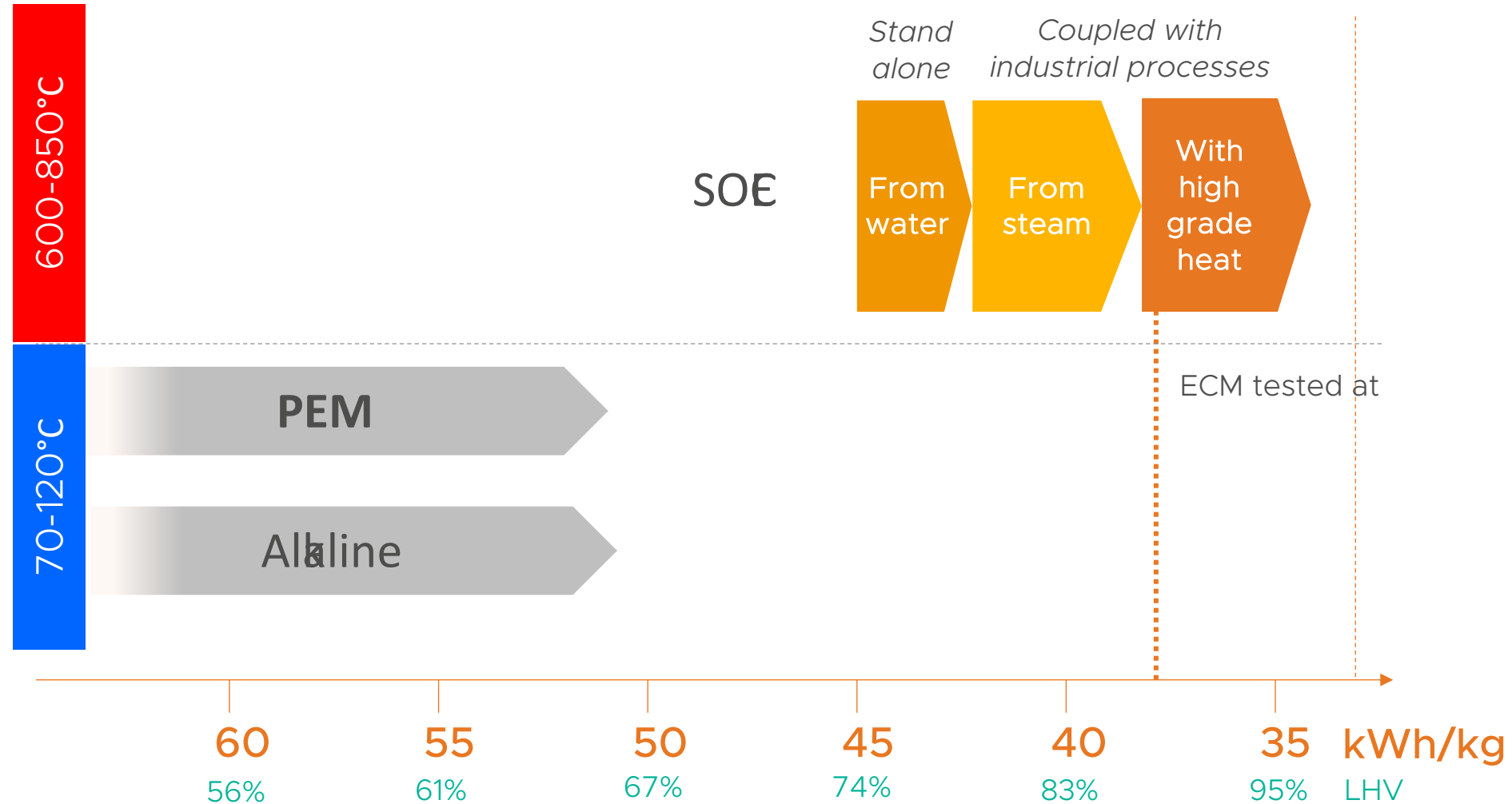


Ceria costs

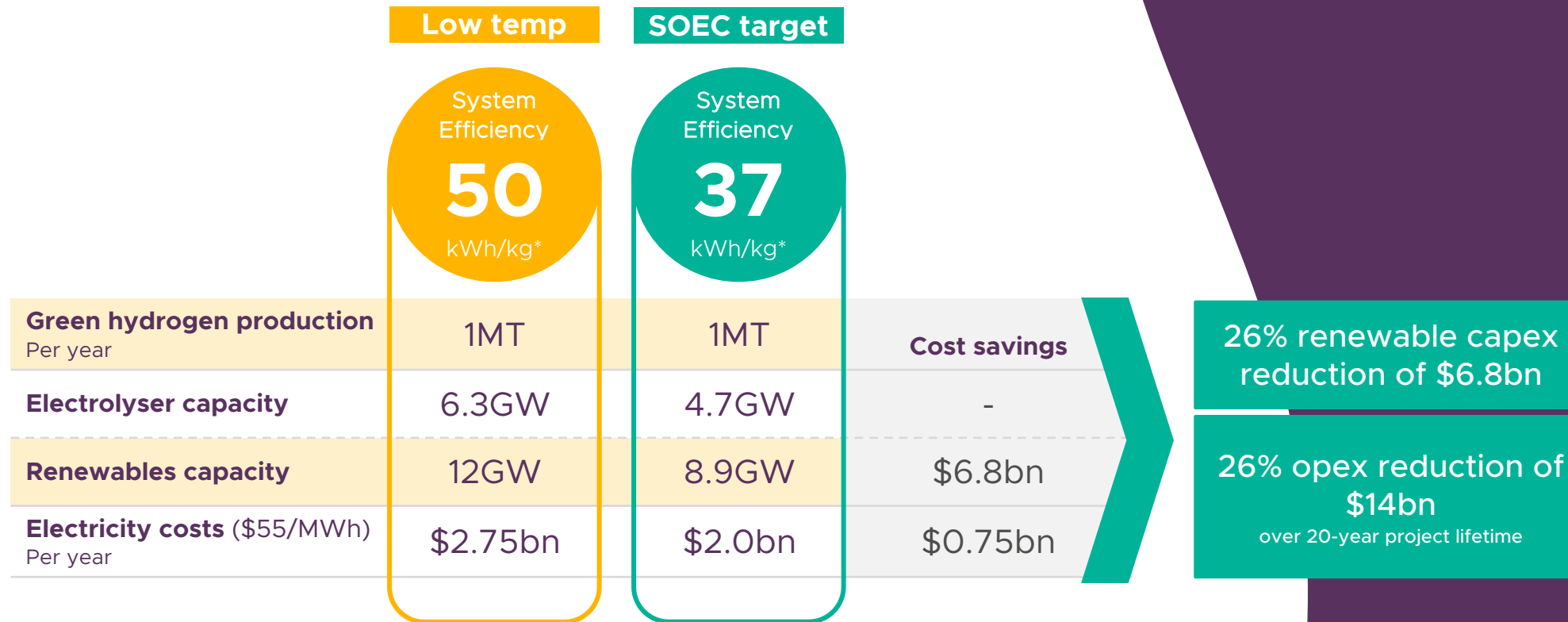
1/1,000th platinum
1/70,000th iridium
1/10th nickel

Low operating
temperature
500 to 600C

SOEC intrinsic thermodynamic advantage



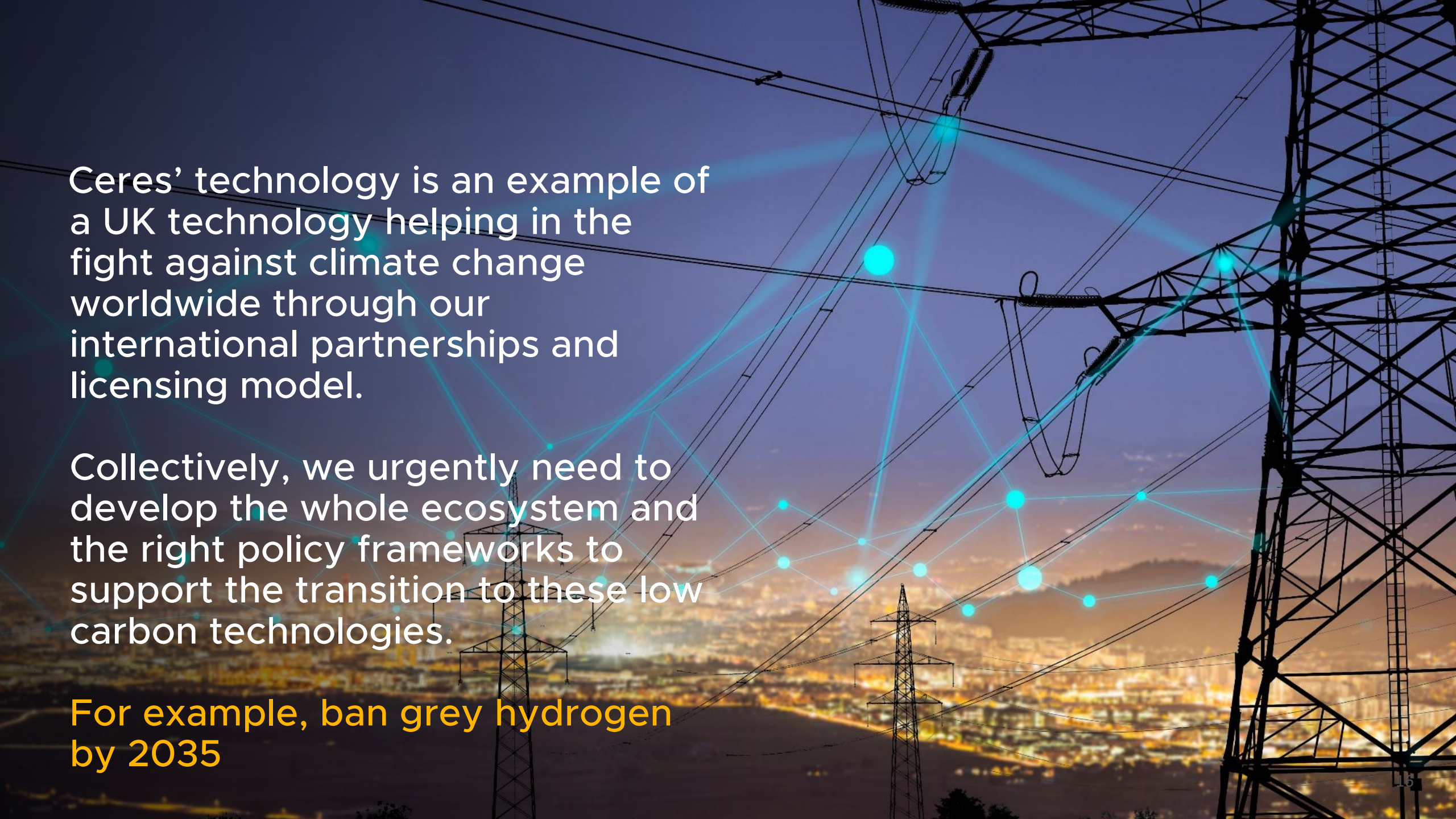
Indicative 2030 project costs for 1MT of green hydrogen in industrial processes



Assumptions used in calculations: Electrolyser System Installed CapEx: \$600/kW; Wind:Solar ratio: 67:33; Renewable Capacity factor: 53%; Electrolyser Capacity Factor: 90%; ***References for renewable energy cost and efficiencies:** [Renewable power generation costs in 2021 \(irena.org\)](#); [Green hydrogen cost reduction: Scaling up electrolyzers to meet the 1.5C climate goal \(irena.org\)](#)

MW-class SOEC system installed at test site in Germany





Ceres' technology is an example of a UK technology helping in the fight against climate change worldwide through our international partnerships and licensing model.

Collectively, we urgently need to develop the whole ecosystem and the right policy frameworks to support the transition to these low carbon technologies.

For example, ban grey hydrogen by 2035

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Thank you

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